World First Pressurised Subsea Pipeline Repair
Facilitated By A Combination Of
Non-Piggable And Piggable Isolation Tools
Yacheng Pipeline Repair Case Study

In October 2013 an anchor strike damaged a 780km 28” gas pipeline from Yacheng Platform to Hong Kong. Damage occurred in a water depth of 90m at the future midline gas compression PLEMS.

This year (2016) COOEC Subsea, on behalf of CNOOC, performed a subsea repair on the Yacheng pipeline, located in the South China Sea.

**Damage and Initial Temporary Repair Actions**

- North PLEM overturned and offset by 3m.
- 28” Pipeline tie-in section at North PLEM severely buckled ~ secured and supported the damaged pipe section.
- 14” bypass (400m) installed between South PLEM and North PLEM ~ 28” valves closed.
- Two leaks from valves in the North PLEM sealed.
Permanent Repair

- Removal of existing PLEM, the 400m pipeline section between them and the severely buckled pipeline section.
- Recovery of both pipeline ends onto a pipe-lay vessel.
- Installation of new pipeline sections and tie-in flanges onto existing pipeline and re-laid onto seabed.
- Installation of two new PLEM, 25m apart as opposed to original 400m.
- Tie-in of both ends of the pipeline to the new PLEM.
- Tie-in spool connected between the PLEM.

During permanent repair;
- 28” Pipeline remained pressurised (780km at 50bar / 725psi).
- No residual seawater was allowed to remain in the system.
MSV HYSY 286

**HYSY 286 MSV (DP3)**

- Overall length: 140.75m
- Breadth molded: 22m
- Draft (max): 6.6m
- Deck: 1900m², 10T/m²
Hot Tap Fitting Deployed and Fitted to Pipeline

Handling frame with hot tap fitting and hot tap machine being deployed

North PLEM showing damaged pipe section preventing deployment of piggable isolation tool

Hot tap fitting and hot tap machine installed
Intervention and Isolation

- **Hot Tap Intervention**
- **BISEP Deployment**
- **BISEP Isolation**

*The Coupon*
Subsea Launcher Installed - Once Safe Access Provided by BISEP

BISEP provides safe DBB access into pressurised pipeline

ROV handling launcher subsea

Subsea launcher over boarding

Temporary subsea launcher connected to pipe end (c/w two Tecno Plugs)
Pigging the Tecno Plugs into the Pipeline with Nitrogen

1st Tecno Plug pigged 700m with Nitrogen against pipeline pressure 50bar
2nd Tecno Plug pigged 10m passed hot tap fitting to lock in 30bar Nitrogen
Tecno Plugs Pigged, Set and Proved

Flangeless Subsea Launcher recovery

Hot tap fitting removed
Pipeline Isolated with Tecno Plugs – 4 Plugs Simultaneously

Both sides of the pressurised pipeline isolated – 4 Tecno Plugs simultaneously

1st Plugs isolating 50bar pipeline gas
(700m from pipeline ends)

2nd Plugs locking in 30 bar nitrogen to aid pipeline recovery to surface
Pipeline Lay Down & Plug Repositioning

Pipeline with 400m new section laid back onto seabed with new tie-in connection.

To prevent flooding new section during pipeline tie-in
2nd Plug was unset and repositioned, using locked in 30bar Nitrogen.
New PLEMs Installed

Tecno Plugs unset and recovered into temporary subsea receiver
New PLEMs (25m apart) Connected Together with Closure Spool
Schedule

- Receive Tender (End of July)
- Contract Award (End of August)
- LOI for Long Leads
- FAT (Late Dec / Early Jan 2016)
- COOEC & CNOOC witnessed
- Freight, Mobilisation (Mid January 2016)
- 2 weeks for Customs (Client Responsibility)
- In Country SIT (Early Feb 2016)
- Offshore Workslope (Mid March / Mid May 2016)

22 – 24 weeks (to Mobilise)

Non negotiable, 8 week execution schedule
Conclusion & Lessons Learnt

- Culture
- Logistics
- Equipment worked flawlessly …
- Very Happy Clients … CNOOC & COOEC
- Milestone Project
Thank You For Your Attention
Questions?

for more information visit
www.statsgroup.com
COPYRIGHT & DISCLAIMER

Copyright
Copyright of all published material including photographs, drawings and images in this document remains vested in STATS (UK) Ltd and third party contributors as appropriate. Accordingly, neither the whole nor any part of this document shall be reproduced in any form nor used in any manner without express prior permission and applicable acknowledgements. No trademark, copyright or other notice shall be altered or removed from any reproduction.

Disclaimer
Although STATS Group believes that the Presentation and the references therein are based upon reasonable assumptions, it can give no assurance that the actual results will be as set out in the Presentation. STATS Group is making no representation or warranty, expressed or implied, as to the accuracy, reliability or completeness of the Presentation or the data referenced therein, and neither STATS (UK) Ltd nor any of its directors, officers or employees will have any liability to you or any other persons resulting from your use.

STATS Group consists of many legally independent entities, constituting their own separate identities. STATS Group is used as the common brand or trade mark for most of these entities. In this presentation we may sometimes use “STATS”, “we” or “us” when we refer to STATS Group companies in general or where no useful purpose is served by identifying any particular STATS Group company.